



# Water Conservation Plan Form Golf Course Irrigation

## GENERAL INFORMATION

**DRAFT**

5/2007

Applicant Name: \_\_\_\_\_

Golf Course Name: \_\_\_\_\_

CUP Number: \_\_\_\_\_

Date Plan Submitted: \_\_\_\_\_

Agent's Name: \_\_\_\_\_

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### Section 12.6.1.1 of the Applicant's Handbook States:

Each applicant for an individual permit for a golf course or recreational-type water use must submit a water conservation plan for their facility to the District at the time of permit application. The plan must contain specific activities designed to conserve water. At a minimum, the water conservation plan must include:

- (a) A program for increasing the water use efficiency of the applicant's operation;
- (b) An analysis of the economic, environmental and technical feasibility of using reclaimed water, recycling water on-site, and utilizing the lowest quality water source possible;
- (c) Develop and implement an employee awareness and player education program concerning water conservation; and
- (d) Procedures and timeframes for implementation and for periodic assessment and revision of the water conservation plan.

In evaluating each proposed water conservation plan, the District will consider:

- The specific proposed use relative to other similar uses
- Available technology
- Economic feasibility

## Section I – WATER USE EFFICIENCY

### I. Conservation Service Plans:

If you have any of the following information, please attach a copy:

- Natural Resources Conservation Service (formerly Soil Conservation Service) Irrigation Water Management Plan
- Other written information describing your water conservation activities

### II. Water Use Efficiency:

Answer the following regarding specific water use practices:

1. Have you conducted a water audit of your golf course irrigation system?

YES  NO

If yes,

Attach a copy of the audit.

Was the audit conducted by a Certified Golf Course Irrigation Auditor?

YES  NO

If no,

Who conducted the audit? \_\_\_\_\_

Describe the audit procedure and results including a list of result parameters such as Distribution Uniformity and Precipitation Rates in each test area. Explain all corrections and repairs that were made as a result of the audit.

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If no,

A golf course irrigation audit is required at least every five years for projects using ground water or natural surface water bodies (lakes and rivers) for all or part of their irrigation water source. Audits may be required for applicants using lower quality water sources if past water use has been inefficient or the potential for competing water users exists.

Audits must be performed by a certified golf course irrigation auditor with certification verified by District staff, evaluate a minimum of three separate fairways (two for 9-hole and five for 27-hole golf courses), and follow the format detailed in Section IV of this form.

Fairways chosen for auditing must be different from ones previously audited during the duration of the existing permit.

Provide a date by which the irrigation audit will be completed: \_\_\_\_\_

2. What method(s) do you use to determine when to irrigate?

- Computerized Irrigation System  
List inputs into system \_\_\_\_\_
- Rain Gauges
- Soil Moisture Monitoring Device(s)
- Observation Well(s)
- Judgment  
Explain \_\_\_\_\_
- Other  
Explain \_\_\_\_\_

3. How is irrigation duration determined? Run times should vary depending on the sprinkler type and the precipitation rates.

\_\_\_\_\_  
\_\_\_\_\_

4. How often do you irrigate (assuming no rain) and how much water is applied?

	Frequency (number of irrigation events per week)	Duration (minutes per irrigation cycle)	Amount (inches per irrigation cycle)
Greens			
Tees			
Fairways			
Roughs			

5. Is an irrigation plan (schematic) available for this project?

YES  NO

If yes,

Submit a copy of the irrigation plan with this water conservation form.

6. Is the system operated manually or automatically?

Manually  Automatically

If the system is operated automatically using a timer, what measures are taken to ensure that overwatering does not occur?

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7. Do you apply fertilizer? YES  NO

If yes,

Are the fertilizers applied through the irrigation system?

YES  NO

Do you fertigate during a regularly scheduled irrigation application?

YES  NO

If no,

Propose an implementation schedule to coordinate fertilization with the irrigation cycle or provide an explanation as to why this change cannot be undertaken.

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8. What months do you apply fertilizer? \_\_\_\_\_

9. What type(s) of grass is planted or planned for each area of the golf course?



15. Summarize your maintenance and repair schedule by indicating when each of the following tasks is performed.

- (A) weekly                      (B) monthly                      (C) every time you irrigate  
(D) as needed                      (E) not feasible                      (F) not applicable

Using a pressure gauge to check system pressures and flow rates for leak and clog detection.

A      B                      C                      D                      E                      F

Checking controller/timers for accuracy.

A      B                      C                      D                      E                      F

Cleaning system components (valves, filters, meters etc.).

A      B                      C                      D                      E                      F

Repairing leaks and clogs.

A      B                      C                      D                      E                      F

Repairing worn or malfunctioning nozzles.

A      B                      C                      D                      E                      F

Checking to ensure sprinklers are not irrigating paved or other non-irrigated areas.

A      B                      C                      D                      E                      F

Conducting audits of the irrigation system.

A      B                      C                      D                      E                      F

Other maintenance (explain): \_\_\_\_\_

A      B                      C                      D                      E                      F

16. *Florida Statute*, Part VI, Chapter 373.62 requires the installation and operation of a functioning rain sensor. Is a rainfall shut-off sensor installed on the irrigation system?

YES       NO

If no,

Provide a schedule for installing a rainfall shut-off sensor on the irrigation controller of your irrigation system.

\_\_\_\_\_  
\_\_\_\_\_

17. The rain-sensor must be maintained and operational in accordance with the manufacturer's specifications on the irrigation system for duration of your Consumptive Use Permit.

Is the existing rainfall shut-off sensors regularly checked to ensure that they are working in accordance with the manufacturer's design specifications?

YES  NO

If yes,  
Describe maintenance check schedule.

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If no,  
Propose maintenance check schedule.

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18. Which of the following irrigation system improvements do you currently use or do you plan to implement and when.

- Computerized irrigation system Date \_\_\_\_\_
- Pressure regulation Date \_\_\_\_\_
- Other (explain)\_\_\_\_\_ Date \_\_\_\_\_

19. Is your golf course located in an area where high chloride water (saline water) is present in the groundwater?

YES  NO  Don't Know

If yes,  
Do you utilize the salt tolerant turf grass Seashore paspalum?

YES  NO

If no,  
If you are not irrigating with lower quality water sources, investigate the feasibility of converting your turf to the salt tolerant turf grass Seashore paspalum, other drought tolerant grasses or grass that can tolerate lower quality water. Provide

an explanation as to when you would be able to convert the turf or provide an explanation as to why it would not be feasible to convert your turf.

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20. Does your golf course have a clubhouse or concession stand operated by this applicant with restroom and/or domestic facilities?

YES  NO

If yes,

Are the facilities equipped with the following low flow plumbing fixtures:

≤ 1.6 gallon per flush (gpf) toilets	YES <input type="checkbox"/>	NO <input type="checkbox"/>	N/A <input type="checkbox"/>
≤ 1.0 gpf urinals or waterless	YES <input type="checkbox"/>	NO <input type="checkbox"/>	N/A <input type="checkbox"/>
≤ 2.5 gallons per minute (gpm) showerheads	YES <input type="checkbox"/>	NO <input type="checkbox"/>	N/A <input type="checkbox"/>
≤ 2.5 gpm kitchen faucets	YES <input type="checkbox"/>	NO <input type="checkbox"/>	N/A <input type="checkbox"/>
≤ 2.0 gpm bathroom faucets	YES <input type="checkbox"/>	NO <input type="checkbox"/>	N/A <input type="checkbox"/>

If any of these facilities is not equipped with low flow plumbing devices, propose an implementation schedule for converting these fixtures to low flow devices or provide an economic feasibility study explaining why you cannot convert to low flow devices.

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21. Are landscape areas around the golf course, clubhouse or concession stands irrigated?

YES  NO

22. How many acres of landscape areas are irrigated? \_\_\_\_\_

23. Has water efficient landscaping (xeriscape, Florida Friendly or Waterwise principles) been incorporated into the design of the landscape areas?

YES  NO

If no,

Propose an implementation schedule for planting or converting existing landscape areas to incorporate water efficient landscaping principles or provide an economic feasibility study as to why this type of planting cannot be done.

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24. List the types of plants planted or proposed for planting in your landscape areas.

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25. Is the irrigation system designed so that plants with similar irrigation requirements are on the same irrigation zone (for example, annuals, drought tolerant shrubs and turf grasses) and plants with different water needs are on separate irrigation zones?

YES  NO

If no,

Propose a plan to redesign the irrigation system and landscape areas so that plants with similar irrigation requirements are irrigated together or provide an explanation as to why this type of design cannot be implemented.

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26. Of the total landscape acreage provided above how many acres are turf grass? \_\_\_\_\_

27. How many acres of your landscape area are planted with drought-tolerant plants that do not require regular irrigation? \_\_\_\_\_

28. How many acres of your landscape area are planted with drought-tolerant plants and/or natural vegetation that do not require *any* irrigation? \_\_\_\_\_

29. Attach pictures of all landscape areas that do not require regular irrigation and/or are planted with drought-tolerant or natural vegetation that does not require regular irrigation.

30. Propose a plan to reduce the areas of turf grass and replace these areas with native or drought tolerant plants/vegetation that require less irrigation.

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**Note: Information on plants that require less irrigation (xeriscape, Florida friendly and Waterwise) is available on the District's web site at [www.sjrwmd.com](http://www.sjrwmd.com). Follow the link for Water Restrictions/Water Conservation.**

31. Indicate which of the following water conservation measures you have undertaken or will undertake for your landscape areas and when.

- |   |            |
|---|------------|
| <input type="checkbox"/> Soil improvements  | Date _____ |
| <input type="checkbox"/> Using water efficient sprinklers                                   | Date _____ |
| <input type="checkbox"/> Avoiding watering sidewalks, parking lots<br>and other paved areas | Date _____ |
| <input type="checkbox"/> Mulching   | Date _____ |

32. Is water used for outdoor use other than irrigation, such as cart washing.

YES  NO

If yes,

Describe the uses and how water is conserved for these uses.

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33. What is the source of water used for outdoor use other than irrigation.

- Reclaimed water
- Potable water from public supply
- Surface water
- Groundwater

If groundwater,

Is a particular well(s) assigned only for this use?

YES  NO

If yes, what is the source of the groundwater?

- Surficial aquifer
- Intermediate aquifer
- Floridan aquifer
- Do not know

Provide the well ID(s) \_\_\_\_\_

***Note: Include this well on Table 2 of the CUP application form and locate it the map you provide with the permit application.***

## Section II – LOWEST QUALITY WATER SOURCE

As part of this permit application, the SJRWMD requires that a feasibility analysis of the availability of a lower quality source of water be completed. This analysis includes an evaluation of the availability of reclaimed water, stormwater and surface water, as well as other potentially reliable sources of water.

Section 10.3 (f) and (g) of the Applicant's Handbook State:

When reclaimed water is readily available it must be used in place of higher quality water sources unless the applicant demonstrates that its use is either not economically, environmentally or technologically feasible.

The lowest quality water source, including reclaimed water or surface water (which includes stormwater), is addressed in paragraphs 40C-2.301(4)(f) and (g), and must be utilized for each applicable consumptive use.

### RECLAIMED WATER

Do you currently use, or if you are constructing a new golf course, will you be utilizing reclaimed water for irrigation once the course is constructed?

YES  NO

*If yes, answer the following questions:*

1. Provide the name of the facility providing the reclaimed water.

\_\_\_\_\_

2. Provide the date that reclaimed water became or will become available.

\_\_\_\_\_

3. Is the reclaimed water discharged into a surface water body or is it delivered via a pipeline into the irrigation system?

Surface water

Pipeline

If surface water,

Provide the name of the holding pond(s) \_\_\_\_\_

Is the pond lined? YES  NO

Is the pond part of a stormwater management system? YES  NO

If yes,

Is the pond interconnected with other ponds? YES  NO

If yes,

Does the pond have a control structure that prevents water from flowing out of the holding pond into the other ponds?

YES  NO

*If no, answer the following questions:*

1. Provide the name, address and contact person for all domestic wastewater facilities within a five-mile radius of your site.

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None within five miles

2. Have you contacted these individuals about the availability of reclaimed water?

YES  NO

**Provide a written response from each facility listed detailing the availability of reclaimed water.**

3. Have reclaimed water lines and/or a reclaimed water holding been included in the design of the golf course in anticipation of receipt of reclaimed water?

YES  NO

4. If you have determined that it is not feasible to accept reclaimed water at this time, you will need to demonstrate to the District that it is not economically, environmentally or technologically feasible to accept reclaimed water within the requested permit duration.

### SURFACE WATER

Do you currently use, or are you proposing to use, any surface water sources for irrigation?

YES  NO

*If yes, answer the following questions:*

1. What is the source of the surface water?

- Stormwater management system
- Natural lake
- River
- Other (explain) \_\_\_\_\_

2. What percentage of your golf course is irrigated with surface water? \_\_\_\_\_%

3. Do you augment the surface water source with groundwater from wells?

YES                       NO

If yes,

Do you monitor the surface water level and begin and cease augmentation at prescribed levels?

YES                       NO

If yes,

Provide the water level elevation (National Geodetic Vertical Datum - NGVD) that augmentation begins and the water level elevation at which augmentation ceases.

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If no,

Propose an implementation schedule to establish a water level elevation (NGVD) regulation schedule.

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4. Are any other non-potable sources of water used for irrigation?

YES                       NO

If yes, explain.

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GROUNDWATER

Is groundwater used or proposed to be used for golf course irrigation?

YES

NO

*If yes, answer the following questions:*

1. What is the source of the groundwater?

- Surficial aquifer
- Intermediate aquifer
- Floridan aquifer
- Do not know

If Floridan aquifer,

Is your project located in an area where water in the Floridan aquifer is potable (drinking water quality)?

YES

NO

Do not Know

If yes,

Provide an evaluation of the feasibility of using lower quality water from a reclaimed water source, surface water source or the surficial or intermediate aquifers instead of the Floridan aquifer for irrigation. A feasibility assessment would include an evaluation of the amount of water available (in MGY) from these lower quality water sources versus the irrigation demand.

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2. Are the groundwater wells plumbed directly into the irrigation system?

YES

NO

3. Is the groundwater used for augmentation of a surface water body also used for irrigation?

YES

NO

If yes,

Provide the name of the surface water body \_\_\_\_\_

Provide the acreage of the surface water body \_\_\_\_\_

Is the surface water body lined?      YES       NO

If yes,

What type of material is the liner? \_\_\_\_\_

### Section III – PLAYER EDUCATION / EMPLOYEE AWARENESS

The water conservation plan must contain an education program. If you have not implemented a program to date, propose an implementation or provide information why this program cannot be implemented.

If you have undertaken an education program, provide examples of water conservation information you provide to the players and employees.

- Using the appropriate letter, indicate which of the following player education and employee awareness activities are currently being implemented and which you plan to implement and when.

(C) Currently implemented      (P) Proposed to be implemented

- Provide copies of all water conservation information that is distributed or made available to the public.

C or F	Activity	Date activity was implemented or is proposed to be implemented
	Using paycheck stuffers to provide water conservation tips and information to employees.	
	Using special mailings, memos or email to provide water conservation tips and information to players or employees.	
	Publishing and distributing water conservation tips and information through employee newsletters or public bulletin boards.	
	Writing new and/or revising employee operating guides and manuals that describe changes made to implement water conservation activities.	
	Providing water conservation material to schools.	
	Conducting public tours of the golf course.	
	Operating information booths, which include water conservation literature, at special events.	
	Seeking employees' ideas for water conservation using contests or reward programs.	
	Installing signs in restrooms encouraging water conservation.	
	Appointing an employee water conservation coordinator to design and implement your internal water conservation plan.	
	Conducting other player education and employee awareness activities (explain) _____ _____	

2. Of the education and awareness programs you have implemented, which have been particularly effective? How was the effectiveness evaluated?

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3. Of the education and awareness programs you have implemented, which have not been effective? Why?

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## Section IV – IRRIGATION AUDIT GUIDELINES

The guidelines presented here were developed by the Irrigation Association (IA) and are intended to function as recommendations in auditing of golf course irrigation systems in the St. Johns River Water Management District. They have been designed to aid golf professionals in field procedures and techniques and in irrigation performance calculations. Audits must be performed by a certified golf course irrigation auditor with certification verified by District staff.

Recommendations and projections from the guidelines and their accuracy depend upon the quality of measurements and data provided by the individual user. The Irrigation Association makes no warranty, implied or expressed, as to the results obtained from these procedures.

### Step #1

- Pre-site Inspection
- Irrigation system should meet all local codes
- System should be in working condition; all operational defects repaired

### Step #2

- The audit should be performed when winds are less than 8 mph or when weather conditions are similar to those experienced during normal golf course operations.
- Pressure tests must be conducted at normal operating conditions at the sprinkler using the appropriate pressure-testing device at the beginning and end of every zone audited.
- The critical test area is defined as three sprinklers in length going up or down the fairway with the width being the mowed edge of the fairway.
- Catchments for a test area to be aligned on a grid layout, all catchments must be uniform in size and type.
- The catchments along the edge of the fairway cut should be placed 12 to 24 inches from the edge.
- Catchment spacing shall be either 20 feet x 20 feet or 25 feet x 25 feet in one of the configurations shown in figures 1, 2, and 3 on page 22.
- Test running times must be the same for each test area.
- When the test area contains multiple stations, the station run times must be adjusted to achieve a matched precipitation across the test area.
- Sprinklers must run for a minimum five rotations during the test.
- All test results must be read in milliliters (ml) and it is recommended that a minimum of 25 ml of water be collected.

### Step #3

- The following data must be documented and submitted in the audit report:
  - Catchment locations and readings
  - Sprinkler locations, spacing, and rotation speed
  - Testing run times
  - System pressure readings with locations
  - Age of irrigation system
  - Make, model, and nozzle of sprinklers
  - Make and model of field controllers and central control system
  - Soil types and root zone depths
  - Wind speed readings
  - Date and time of testing
  - Fairway width and length audited
  - Calculations of Distribution Uniformity and Precipitation Rates
  - Summary of audit findings
  - Recommended corrective actions

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The following calculation sheet for Distribution Uniformity ( $DU_{LQ}$ ) and Precipitation Rate ( $PR_{NET}$ ) is provided as a recommended generic format for each test area:

Date/Time: \_\_\_\_\_

Location: \_\_\_\_\_

Wind Speed: \_\_\_\_\_ mph    Soil Type: \_\_\_\_\_    Root Zone Depth \_\_\_\_\_ in.

Sprinkler Make/Model: \_\_\_\_\_    Age of Sprinkler System: \_\_\_\_\_ yrs.

#### **$DU_{LQ}$ and $PR_{NET}$ Calculations**

- To calculate distribution uniformity use the following formula:

- $$DU_{LQ} = \left( \frac{\text{Average Catch in Lower Quarter}}{\text{Average Catch Overall}} \right) \times 100$$

- To calculate precipitation rate use the following formula:

- $$PR_{net} = \frac{3.66 \times V_{avg}}{t_R \times A_{CD}}$$

$PR_{net}$  = station precipitation rate {in./h},  
 $V_{avg}$  = average catch volume for station {mL},  
 $t_R$  = testing run time {min},  
 $A_{CD}$  = catch device throat area {in.<sup>2</sup>}.

Catchment Type: \_\_\_\_\_ Catchment Device Area ( $A_{CD}$ ): \_\_\_\_\_ in.<sup>2</sup>

Can #1 _____	#13 _____	#25 _____	#37 _____	#49 _____	#61 _____
Can #2 _____	#14 _____	#26 _____	#38 _____	#50 _____	#62 _____
Can #3 _____	#15 _____	#27 _____	#39 _____	#51 _____	#63 _____
Can #4 _____	#16 _____	#28 _____	#40 _____	#52 _____	#64 _____
Can #5 _____	#17 _____	#29 _____	#41 _____	#53 _____	#65 _____
Can #6 _____	#18 _____	#30 _____	#42 _____	#54 _____	#66 _____
Can #7 _____	#19 _____	#31 _____	#43 _____	#55 _____	#67 _____
Can #8 _____	#20 _____	#32 _____	#44 _____	#56 _____	#68 _____
Can #9 _____	#21 _____	#33 _____	#45 _____	#57 _____	#69 _____
Can #10 _____	#22 _____	#34 _____	#46 _____	#58 _____	#70 _____
Can #11 _____	#23 _____	#35 _____	#47 _____	#59 _____	#71 _____
Can #12 _____	#24 _____	#36 _____	#48 _____	#60 _____	#72 _____

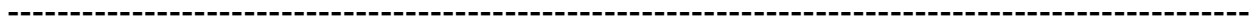
Subtotals \_\_\_\_\_

Run Time ( $t_R$ ): \_\_\_\_\_ Total Catch: \_\_\_\_\_ ml

Calculated Distribution Uniformity ( $DU_{LQ}$ ): \_\_\_\_\_ %

Calculated Precipitation Rate ( $PR_{NET}$ ): \_\_\_\_\_ inches/hour

**Diagram showing fairway length/width audited, sprinkler locations/spacing/rotation speed, catchment locations/spacing/volumes, and pressure readings:**



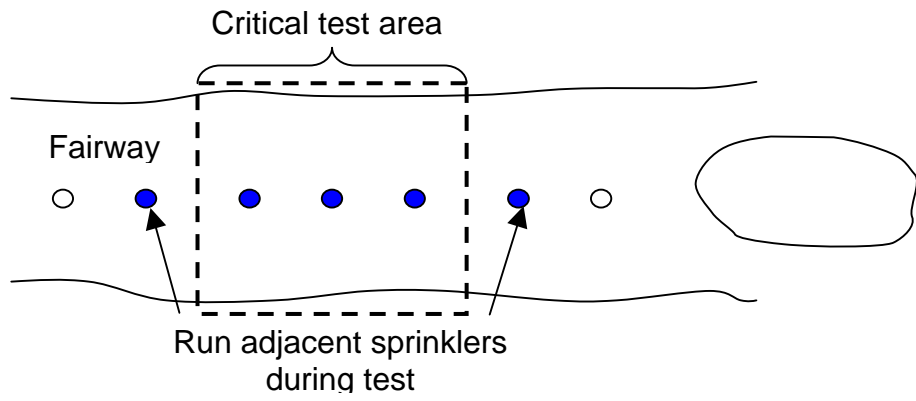


Figure 1. Fairway Single Row Sprinkler Test Area

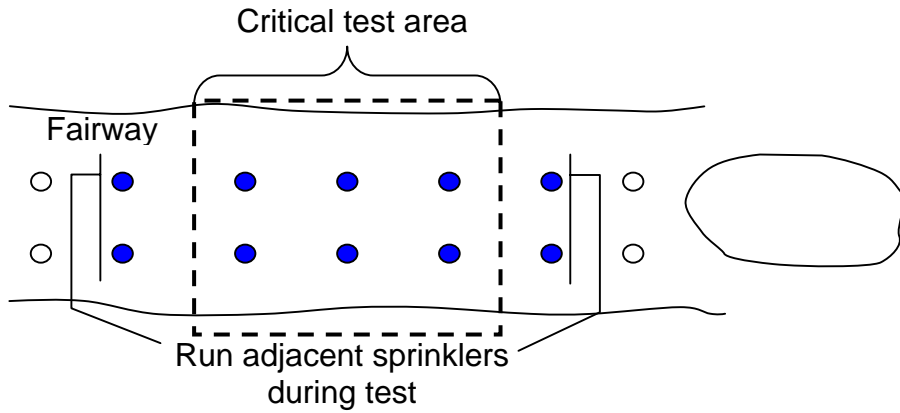


Figure 2. Fairway Double Row Sprinkler Test Area

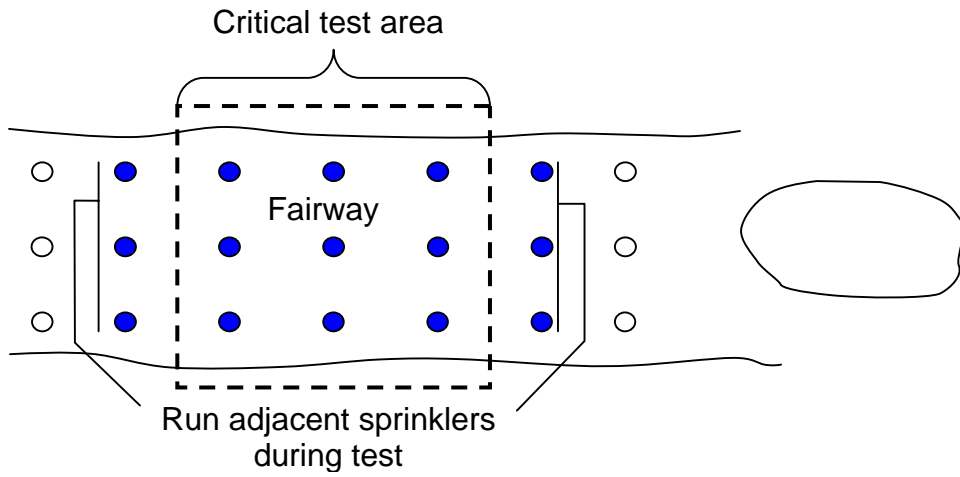


Figure 3. Fairway Triple/Multiple Sprinkler Test Area

## Section V – PLAN IMPLEMENTATION SCHEDULE SUMMARY

In this section please summarize the Water Conservation Plan that you have prepared using this form. Be sure to apply an implementation schedule for each activity or action you have indicated will occur within your requested CUP duration. Water conservation activities must span the duration of the permit.

Activity	Proposed Date of Implementation

Note: A progress report may be required to be submitted at a time specified in permit conditions to address the implementation of the activities.

***Please keep a copy of this plan for your records.***

***Please sign and date this plan:***

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

\_\_\_\_\_  
Phone Number